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Calves have been raised successfully in hutches at South Dakota State University since the 1950s. Calf losses averaged 6 to 8% compared to the nearly 20% losses experienced by many dairy producers. However, calves in hutches need more nutrients during cold weather. The calf at greatest risk to be lost is one that was weaned just before severe weather occurs. This calf may be consuming enough feed to maintain itself under normal conditions but not enough to meet the extra requirements needed under severe weather conditions.

Increasing Energy in Calf Starters

Experiments aimed at helping calves gain better and remain healthier during winter cold have been conducted at SDSU over several winters. The first experiments were aimed to increase energy intake from dry feeds. The usual calf starter is a pelleted mixture of corn, oats, soybean meal, vitamins, minerals, and 20% ground alfalfa hay.

Researchers attempted to increase the energy intake of these calves three ways:

- By increasing the amount of starch in the diet by increasing corn in place of oats.
- By increasing the fat content of the diet by including extruded soybeans in the pelleted mix.
- By providing additional grain mix to the calves during the first six weeks of life. Calves were weaned at five weeks of age so this would provide additional energy a little past the weaning period.

Data in Table 1 illustrate that increasing energy in the calf starter from additional starch (high corn) or fat (soybeans) did not increase weight gains over the control calf starter. Providing additional grain mix during the first six weeks stimulated a little additional feed intake during the first five weeks, although weight gains were not affected.

Table 1. Weight gains and dry feed intake of calves fed high starch, high fat, or supplemental grain mix.

	Treatment				
	Control	High starch[a]	High Fat[b]	Extra grain No	Extra grain Yes[c]
	(lb/day)				
Weight gain					
Weeks 1 to 5	1.06	1.08	0.95	1.04	1.01
Weeks 6 to 12	1.94	1.94	1.81	1.89	1.90
Weeks 1 to 12	1.58	1.58	1.50	1.54	1.56
Dry feed intake, as fed					
Weeks 1 to 5	0.93	0.96	0.94	0.90	0.99
Weeks 6 to 12	5.84	5.83	5.70	5.71	5.87
Weeks 1 to 12	3.78	3.78	3.71	3.69	3.83

[a]Pelleted complete feed contained additional corn in place of oats.
[b]Pelleted complete feed contained extruded soybeans.
[c]Offered additional grain mix during the first six weeks.

Increasing Energy from Milk

The other approach SDSU researchers used to help calves through the winter was to feed more milk, fortify the milk with a dried whey-fat blend powder (WFB), or feed milk more often. The WFB was a blend of dried whey and vegetable oils used in milk replacers.

An experiment was conducted during two winters to more fully evaluate the following:

- Once versus twice a day feeding of milk.
- Fortifying milk with 1/4 pound per day of WFB.
- Feeding more milk (10 pounds versus 8 pounds per day).

Looking at this another way, adding 1/4 pound of WFB to 8 pounds of milk is about the same as:

a) changing the solids content of Holstein milk (about 12% solids) to that of Jersey milk (about 15% solids), or
b) providing the same amount of solids -- about 1.25 pounds per day -- in 8 pounds of Holstein milk as would be provided by 10 pounds of Holstein milk. Eight pounds of Holstein milk usually provides about 1 pound of milk solids.

The respective milk feeding regimes were continued for four weeks, with the amounts fed cut in one-half the fifth week and weaning at five weeks of age. Calves fed twice daily received half of the daily total in each of two feedings. All calves had the pelleted calf starter and grain mix offered free choice during the 10-week experiment.

Data presented in Table 2 indicate two points in regard to helping calves during the winter:

- Calves fed additional solids either from fortified milk (treatments C and D) or from additional milk (treatment E) gained more weight during the milk-feeding period than calves fed only 8 pounds of milk daily.
- Calves fed their milk twice daily (treatments B and D; also treatment E) gained more weight than if fed milk once daily.

This was somewhat contrary to previous research which indicated calves did just as well when milk was fed once or twice daily. However, some of the previous experiments were not conducted during the winter. Dry matter intakes during the milk-feeding period (weeks 1 to 5) were highest for calves fed fortified milk or additional milk (treatments C, D, and E), reflecting the additional solids intake from WFB or milk. Consumption of dry feeds, both pellets and grain mix, were similar for all treatment groups during all periods.

How soon a calf can be weaned can be indicated by how much dry feed a calf is consuming. A calf usually is considered to be able to live satisfactorily without milk or milk replacer as soon as it is consuming more than 1.5 pounds of dry feed daily. In SDSU's research, calves fed 10 pounds of whole milk daily were consuming more than 1.5 pounds of dry feed daily by the fourth week, whereas calves fed the other 4 diets reached that level of dry feed consumption during the fifth week. This may indicate that calves fed 10 pounds of milk daily could be weaned a

Table 2. Weight gains and feed intake of calves fed 8 pounds of milk in one or two feedings daily with or without supplemental whey fat blend (WFB), or 10 pounds of milk daily.

	Treatment				
	A	B	C	D	E
Amount of milk, lb/day	8	8	8	8	10
Times fed/day	1	2	1	2	2
WFB, lb/day	—	—	0.25	0.25	—
	(lb/day)				
Weight gain					
Weeks 1 to 5	0.79	1.04	1.06	1.27	1.35
Weeks 6 to 10	2.18	2.04	2.12	2.29	2.27
Weeks 1 to 10	1.48	1.54	1.59	1.78	1.81
Total dry matter intake[a]					
Weeks 1 to 5	1.62	1.62	1.98	1.83	2.01
Weeks 6 to 10	5.40	5.30	5.58	5.53	5.71
Weeks 1 to 10	3.52	3.46	3.76	3.65	3.86

[a]Includes dry matter from milk and dry feeds during weeks 1 to 5, dry feeds only weeks 6 to 10.

week earlier than those fed 8 pounds daily, which could mean using about the same total amount of milk per calf for both systems. However, during cold weather, you may not want to wean a calf early. A few pounds of milk are less expensive than the dollar loss of a replacement heifer.

Calf scours were not a problem in this experiment, especially when calves were fed two times daily. There were no cases of scours in calves fed 10 pounds of milk. Average number of days with scours per calf for treatments A through D were 0.6, 0.3, 0.8, and 0.5 days per calf.

Other Research

Several other experiments confirmed SDSU's results that feeding the calf more milk or milk replacer and feeding the calf more often during the winter is beneficial.

University of Minnesota researchers found it beneficial to feed calves twice or even three times daily during cold weather. Part of the increased weight gains they observed was attributed to increased feed intake because in cold weather some calves were fed twice as much milk as during milder weather.

Pennsylvania State University researchers found that calves fed a milk replacer containing 10% fat lost weight when subjected to cold temperatures, while those fed 17.5% and 25% fat gained weight. At warmer temperatures, there were no differences in weight gains. While feeding whole milk or high fat (15% or higher) milk replacer twice daily at 8 to 10% of body weight daily (i.e., 8 to 10 pounds per 100 pound calf) may be adequate in warm weather, calves in hutches or other cold environments may need up to 15% of body weight as liquid nourishment when temperatures drop below freezing.

Summary

Calves in hutches need more nutrients during cold weather. These additional nutrients can be provided by:

- Feeding a couple more pounds of milk or milk replacer, or
- Fortifying the milk with 1/4 pounds of milk replacer powder.

During cold weather, feed calves warm (105 F) milk or milk replacer two or three times daily. Milk replacers should be well mixed in warm water.

Milk replacers fed during cold weather should contain at least 15% fat.

Calves can be weaned after they are consuming more than 1.5 pounds of dry feed (hay plus calf starter) daily, although during cold weather it may help the calf to continue feeding milk an additional week or so beyond that point.

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